THE AËRONAUTICAL JOURNAL.

OCTOBER, 1907.

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NOTICES OF The Aëronautical Society of Great Britain.

At a Council Meeting of the Aëronautical Society of Great Britain, held at 53, Victoria Street, Westminster, on Monday, October 7th, 1907,

Lt.-Colonel F. C. TROLLOPE (late Grenadier Guards)

was elected Vice-President of the Aëronautical Society of Great Britain.

The following gentlemen were elected Members of the Society:—

Mr. ADOLFE GUSTAV HEINZE,
Mr. WALLACE RUPERT TURNBULL,
Mr. BASIL WALCOT, R.E.

The opening meeting of the Forty-third Session of the Aëronautical Society of Great Britain will be held at the Society of Arts, John Street, Adelphi, in December next, the date of which will be duly announced.

Amongst the papers read at this meeting will be "The Starting Methods of Aëroplanes," by Mr. José Weiss, M. Aër. Soc.; "Mechanical Aërial Navigation," by Mr. Rankin Kennedy; and "A Study of Model Gliders," by Mr. A. V. Roe.

THE LIBRARY.

The following books and publications have been presented to the Library:—

By the Meteorological Office, "Publications of the International Commission for Scientific Aëronautics."

By the Smithsonian Institution, "Samuel Pierpoint Langley" (Doctor White, Professor Pickering, and Mr. Chanute).

By A. Lawrence Rotch, "The International Aëronautical Conference of October, 1906, at Milan" (A. Lawrence Rotch).

RESEARCH FUND.

A contribution of a sum of £105 towards the Research Fund of the Aëronautical Society of Great Britain has been received from the Mercers' Company.

THE TRAVEL EXHIBITION, 1907.

A Diploma of Honour has been awarded the Aëronautical Society of Great Britain for its loan exhibit in the Aëronautical Section of the Travel Exhibition held at the Horticultural Hall, Westminster, in May last.

ERIC STUART BRUCE
(*Honorary Secretary*).

Three Airships of Three Nations.

I.—THE FIRST BRITISH MILITARY AIRSHIP.

The successful launching of the first British navigable balloon into the unstable ocean of the air at Farnborough on September 10 was an event which has met with

universal approbation. The fact that both France and Germany had added airships to their implements of war had been lately causing a certain amount of public uneasiness that this nation was behindhand in the application of aëronautics to warfare.

The war uses of the navigable balloon as at present developed, have no doubt been exaggerated. Therefore the absence of a British airship did not mean such imminent danger as some have supposed. But it is now being recognised that an aërial vessel which can be steered will be of service in scouting operations, and by its mobility exceed the powers of the ordinary captive balloon, whilst its utility as a destructive agency cannot be entirely ignored.

As might be expected in the case of a military airship, the details of its construction have not been communicated by the authorities. The balloon was, however, seen by many on the day of its first manœuvres, and although it is not possible to vouch for accuracy in the reports concerning detail that have been published, still much concerning the construction of the airship has been obviously manifest.

The "Broad Arrow" of September 14th thus describes the new airship and its manœuvres:—

"The shape of the balloon is that of a sausage, with rounded ends, where the skin of which it is made is gathered and tied. Its length is about 90 ft., and in circumference the same. From end to end it is covered in a network of cordage, which meets about 10 ft. below and is fixed to a light steel framework. Below the latter, some 8 ft., is fixed the car of light steel framework covered with canvas. Of the shape of a boat, it is about 16 ft. long, one-third of it being taken up with the engines fixed in the forepart. These are worked by petrol, the supply tanks being placed in the rigging above. On either side are the propellers, a light wooden framework keeping these clear of the car, to which they work at right angles. A square of sail-cloth stretched on a frame of wood is placed at the rear of the car and is carried up almost to the balloon above. This is fixed like the rudder of a ship, and acts in exactly the same manner, being worked by an arrangement of ropes and pulleys so as to be set at any angle to the car. Two huge wings are laid out flat on the air from either side of the car, and by altering the plane of these the balloon is assisted to ascend or descend while the engines are working. The weight of the car and engines and three occupants is stated to be just over a ton. Mr. F. S. Cody, who has been attached to the Balloon Department for experimental purposes, was in charge of the engines; Colonel Capper steered, and Captain King, of the Balloon Department, completed the crew. The airship rose to about 1,000 ft., with its head to the wind, which was blowing about four miles an hour. On the engines being started, the airship at once moved forward against the wind, rising and descending as the wings at the sides were altered. The steering apparatus was subsequently brought into play and three parts of a circle was made, the arc described being about two miles in extent. The balloon descended on Jersey Brow. Some adjustments having been effected, the airship was again brought out of the shed, and the trial of the earlier part of the day was repeated, but this time a circle of about three miles was accomplished while at a height of nearly half a mile."

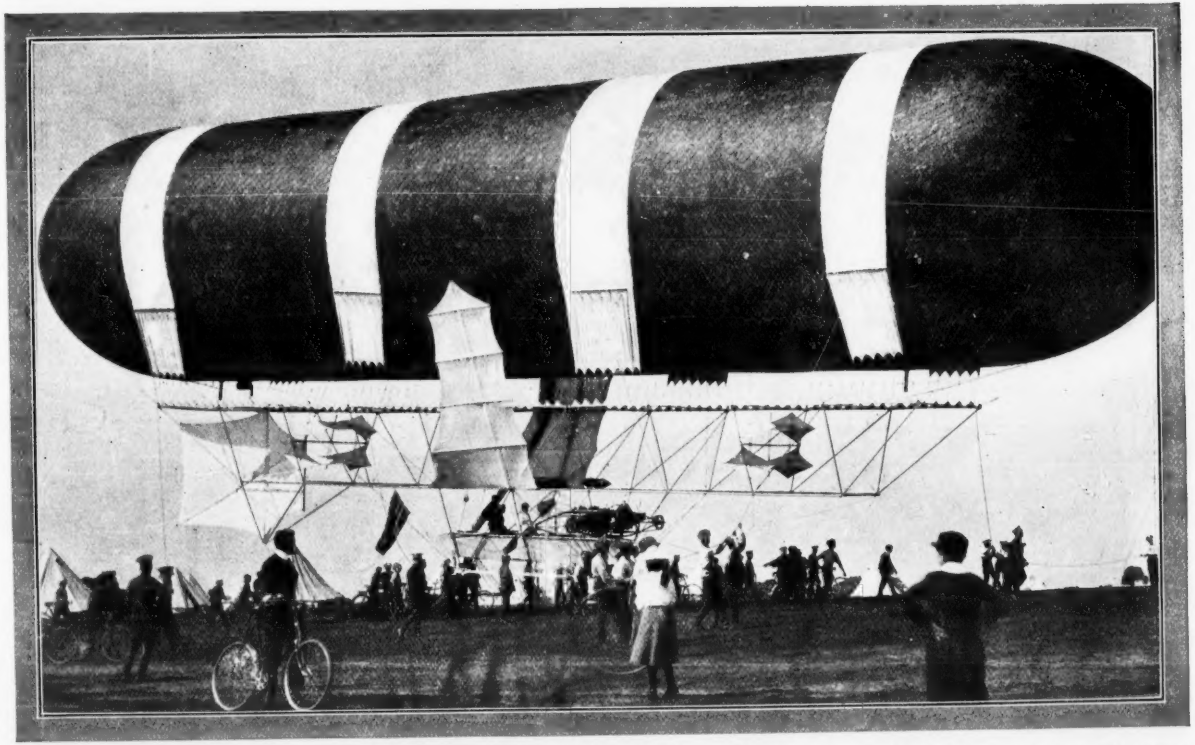
One of the most noteworthy features of the airship is the material of which its envelope is made.

This is the first instance of a navigable balloon envelope having been made of gold-beater's skin. The excellent qualities of this substance for the purpose have been well proved by its long use in the manufacture of the ordinary observation balloons. Foremost amongst those qualities is its power of retaining the hydrogen gas. Capability of long retention is certainly one of the first requirements of a navigable balloon.

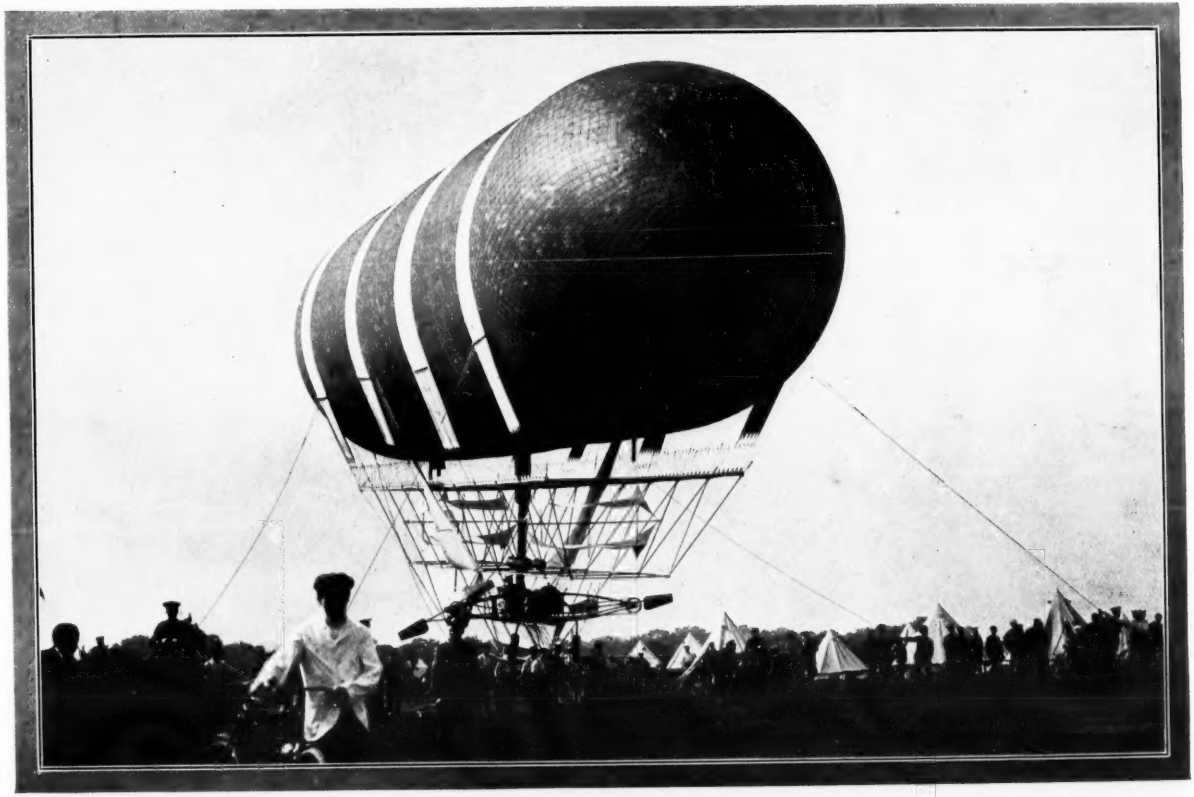
Just as the first proofs of these remarks were being corrected by the editor of this journal a new opportunity was afforded of adding some additional remarks on the practical success of the British airship.

About 11.20 on October 5th there was a sound as of a motor car in the air above the grounds of the residence of the Honorary Secretary of the Aëronautical Society of Great Britain, at Sunningdale, and this was followed by the appearance of Dirigible No. 1, travelling at splendid speed on its way from Aldershot to London.

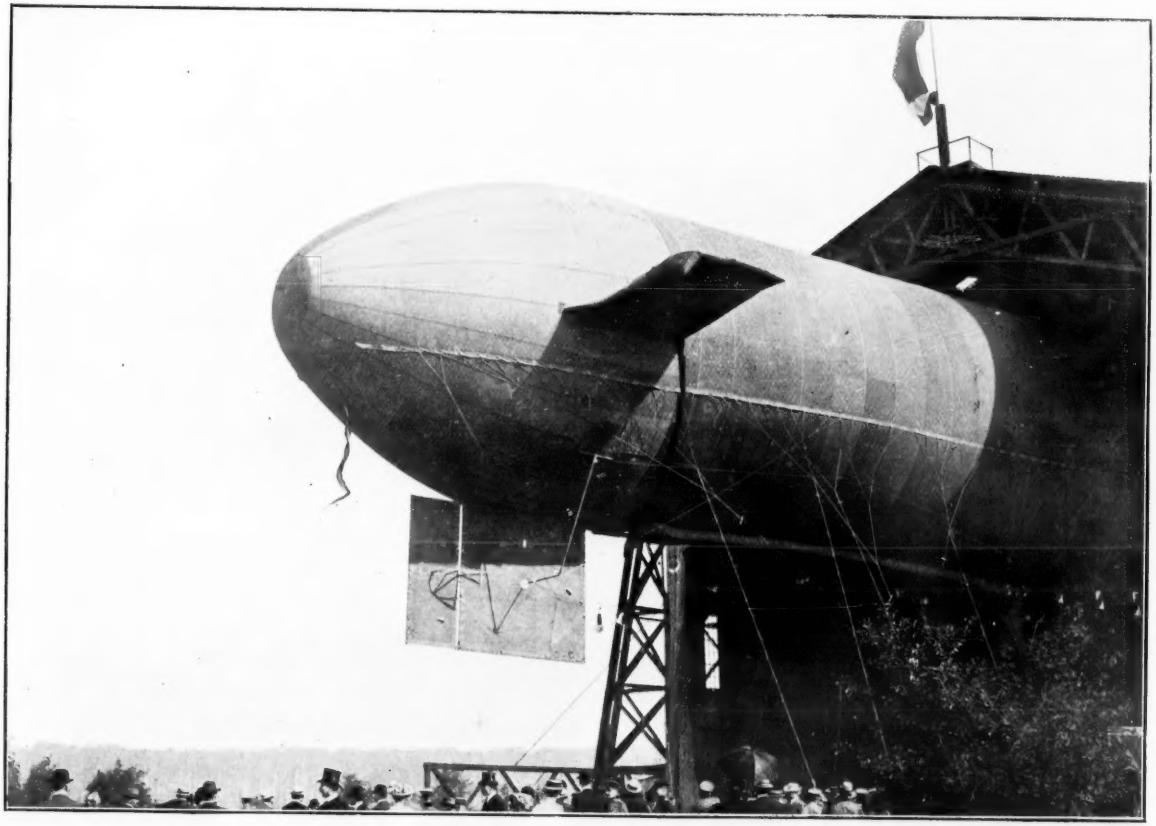
As has already been made generally known by the daily press, the airship exhibited a remarkably fine performance and one reflecting the highest possible credit on those responsible. The airship remained in the air 3½ hours, and but for the



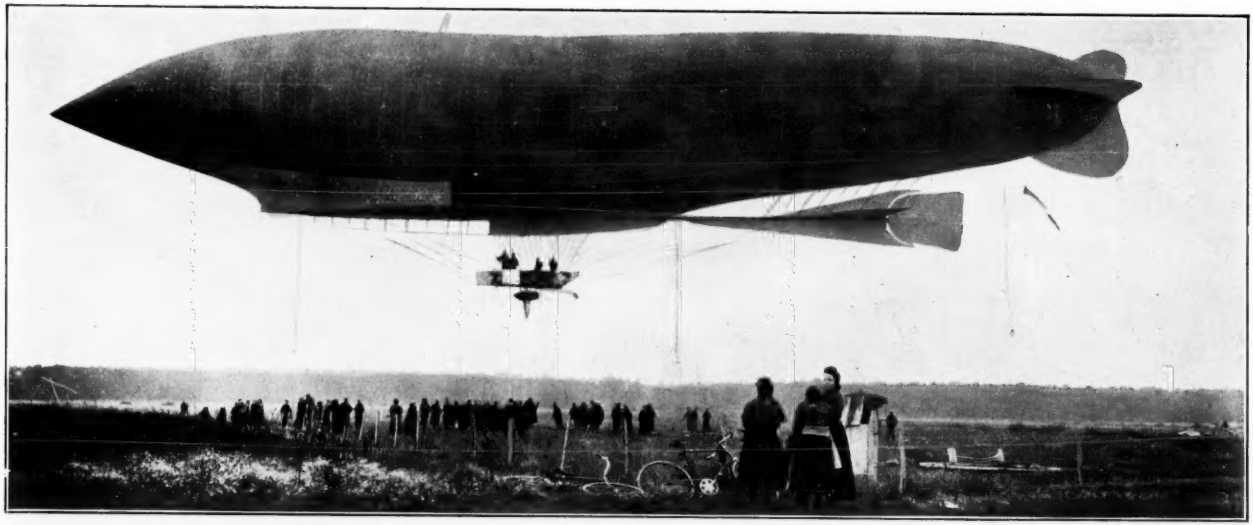
By kind permission of THE BRITISH MILITARY AIRSHIP. [*"The Autocar" and "The Daily Mirror."*



By kind permission of] THE BRITISH MILITARY AIRSHIP. [*"The Autocar" and "The Daily Mirror."*



THE PARSEVAL AIRSHIP.



By kind permission of] **"LA PATRIE."** [*"The Car," and Messrs. Bolak,*

necessity of running for a safe anchorage before an increasing wind, could have remained up 5 or 6 hours longer. The distance travelled was 50 miles and the speed through the air was about 14 miles an hour. The only disappointing feature of the journey was that owing to the wind increasing a return journey was not possible, and thus the present limitations of navigable balloons were exemplified.

The *Times* of October 7th, in an article on the voyage of the airship over London, thus describes the journey:—

"When released, at about 11 o'clock on Saturday morning, it rose steadily on an even keel, and, after making a few curves to test the steering apparatus, settled into a north-easterly course. At Aldershot it was an open secret that London was the objective, and it was anticipated that the airship would reach London at about 1 o'clock. Pursuing a practically straight course, however, the distance was covered in less time, and before half-past 12 o'clock the airship was circling round St. Paul's Cathedral, having previously passed over the War Office. In Whitehall the manœuvres of Nulli Secundus were watched by several members of the Army Council, including Colonel Sir Edward Ward, General Sir William Nicholson, Major-General Hadden, and Lieutenant-General Charles Douglas. The streets were speedily crowded with people watching the progress of the airship, which at many points came so low that it was possible to see something of the working of the mechanism and the movements of the occupants, Colonel Capper, Mr. Cody, and Lieutenant Waterlow. Nulli Secundus also passed over Buckingham Palace and its grounds, and manœuvred above the lawn on which the King occasionally holds reviews. This, it is stated, was a rehearsal of the visit to be paid on October 14th, when His Majesty will inspect the airship. Travelling eastwards, the airship made a wide circuit of St. Paul's Cathedral, afterwards heading against the wind on the return journey. Nulli Secundus was under complete control, but the wind was rather strong, and when over Clapham Common the course was altered for Sydenham. Over the grounds of the Crystal Palace the airship was put through a series of manœuvres, these extending over a period of about a quarter of an hour. Then the airship was lowered to the ground, its final position being in the centre of the cycle track."

The successful journey of the airship over the metropolis points to the advisability of larger national funds being applied to the service of the air, and suggests that if the powers that be can see their way to bestow a materially increased annual grant to the Balloon Department of the British Army, we need not fear being behind other nations in military aëronautics. It is a matter, however, of serious consideration that whilst other Powers have already several of these engines of destruction, each one of which is capable of nearly or quite twice the speed of the British airship, and able to carry a suitable armament for offensive warfare, our solitary representative is but small and of feeble pace, and can carry but little beyond her complement of two hands.

That our designers and aëronauts are now sufficiently skilled to produce more powerful and speedy machines than any now existent may be accepted, but funds in ample though not extravagant amount are absolutely necessary for the purpose.

2.—"LA PATRIE."

The Lebaudy airship was not long in the possession of the French Government before the manufacture of a second balloon of the same type was in progress. The accompanying illustration represents "La Patrie," which made its first journey in November last. In its principal features this balloon resembles its predecessor, though advantage has been taken of experience with the former to effect some details of improvement in the latter, and especially in those minutiæ which will enable it to play its part as an instrument of war.

The envelope is of the fusiform dissymmetrical shape which characterised the former balloon. It is made of cotton covered with indiarubber. Its length is 60 metres instead of 58 metres as was the case in the older balloon. The master diameter 10 metres 30. The volume 3,150 metres instead of 2,960.

The steel tubes which have formed a feature of the Lebaudy type and which convey the thrust of the screws to the oval platform in the centre of the balloon have been retained, but it has been arranged in the improved airship that these tubes can be unfixed so as to enable the balloon to be conveyed over railway telegraphic wires when dismantled it is being transported from place to place.

The ballonet in the new balloon has been

enlarged. It is now 650 metres instead of 500 metres.

A successful feature of the Lebaudy system has been the devices attached to the airship to minimise rolling and pitching. The planes for producing stability in the newer airship have been somewhat modified and further developed. The cross tail at the back of the balloon, especially designed to obviate the rolling and pitching, is longer than the former one, and it has been rounded more at the edges so as to closer resemble a bird's tail. The butterfly arrangement at the back for preserving stability has been retained.

The motor is a Panhard-Levassor of 70 horse-power, the motor in the former airship being only 50 horse-power. The screws are similar to those used in the airship of 1905, and are again placed at the right and left of the car. The car is still made of steel tubes, but it is larger and more accommodating than it was in the older type.

Towards the close of 1906 "La Patrie" made some highly successful journeys, one of the most remarkable and one which determined its acceptance by the French Government being that of November 26th, when the airship several times made the tour of the peninsula of Moissan and came back to the place of departure. The speed attained was estimated at 93 kilometres in 2½ hours, the airship having travelled a good portion of the distance at 45 kilometres an hour.

Its steering capacities have been well tested in many other trials, notably on its first appearance above Paris on December 17th, and on the occasion of its further manœuvres over the Parisian capital on July 8th. Another striking manifestation of its powers was on July 14th on the occasion of the review at Longchamps. On this occasion the possibility of descending by means of the action of the lateral wings mounted on the front of the oval platform in the centre of the balloon was well demonstrated.

On July 22nd M. Clemenceau and General Picquart, the French Minister of War, both ascended in "La Patrie" and expressed their complete confidence in this new engine of war.

THE PARSEVAL AIRSHIP.

As "L'Aérophile" has pointed out, Germany, at the present time, may be said to possess three types of navigable balloons—(1) The "Zeppelin," of the rigid type; (2) the "Parseval," in which the use of rigid materials is reduced to a minimum; (3) the "Gross," which is intermediate between these extremes.

In the Parseval airship special effort has been made to abolish all rigid materials so as to produce simplicity of construction and to render the balloon when deflated easy of transport.

This object has certainly been attained, as one cart drawn by two horses can effect the transport.

Last year satisfactory results were obtained in the trials of the balloon. Those trials have suggested certain modifications and improvements. The point of the envelope has been sharpened, the length has been increased from 48 to 52 metres, the master diameter from 8 metres 57 to 8 metres 70, and the capacity from 2,500 metres to 2,800 metres.

Two ballonets are used to give permanence of form; one of these is placed at the back of the balloon, the other at the front. These are supplied with air by a unique blower, so that the amount of air in them is easily regulated for the facilitation of ascent or descent.

The car is placed 9 metres below the balloon, and accommodates three persons. There is a Mercédès motor of 50 horse-power.

The propeller is four-bladed, being 4 metres in diameter. The blades are of thin steel tubing covered with shirting. The suspension of the car is novel, gliding corels being provided to enable the car to be moved about freely without interference with its parallel position.

The trials with the improved airship have been lately renewed.

The Franco-American Expedition to Explore the Atmosphere in the Tropics.

Mr. A. Lawrence Rotch's paper on the Results of the Franco-American Expedition to Explore the Atmosphere in the Tropics, recently published by the American Academy of Arts and Sciences, is still another testimony to the indefatigable energy of the Director of the Blue Hill Observatory.

Not only was he the pioneer in the systematic exploration of the atmosphere, but he continues steadfastly to extend our knowledge of the upper air. In the History of Science his name will be closely associated with the advent of the new meteorology.

In the important publication to which reference has been made, Mr. Rotch states that it has long been believed that the ascending currents above the thermal equator proceed immediately over the north-east and south-east trade winds as south-west and north-west anti-trades. It is possible that part of the anti-trade sinks down over the high barometric pressure in the north and south Atlantic oceans, and returns with the trade winds, but the greater portion descends north and south of the origin of the trades and continues to the poles as the prevailing south-west or north-west winds of the north and temperate zones respectively.

This theory is based on observations taken throughout the whole year on the Peak of Teneriffe. Although the south-west wind is at a lower level in winter than in summer, there appears to be no evidence to prove that the anti-trade ever reaches the surface of the ocean.

In 1901, at the Glasgow meeting of the British Association, and again in 1901, at the Berlin Congress for Scientific Aëronautics, Mr. Rotch suggested the application of flying kites on steamers to the exploration of the atmosphere in the trade wind region. By the method of utilising steam vessels the kites could be flown independently of wind.

In order to organise the expedition applications for aid were addressed to the Prince of Monaco, and in 1905 to the Carnegie Institution, but without effect.

Professor Hergesell, however, was successful in interesting the Prince of Monaco in the scheme, and upon his yacht, the "Princess Alice," during the summer of 1904 kite flights were made in the region bounded by Spain, the Azores and the Canaries.

Though the heights attained by the kites on several occasions exceeded that of the Peak of Teneriffe, we are told that the south-west current which had been reported on that mountain was not found.

This experience led Professor Hergesell to state at the St. Petersburg Congress of the International Commission for Scientific Aëronautics that he thought this current was due to the disturbing influence of the island, and in the explored region to the interchange of air taking place through the north-west current.

As the existence of the upper return trade seemed to demand further investigation, in 1905 Mr. Rotch, in conjunction with M. Teisserenc de Bort, undertook the task. Each entrusted the research to one of their assistants. Mr. Maurice, of the Trappes Observatory, undertook the work for M. Teisserenc de Bort, and Mr. Clayton, of Blue Hill, for Mr. Rotch.

In June, 1905, Mr. Clayton made the voyage from Boston to Gibraltar *viâ* the Azores on the White Star steamer "Romanie," and raised kites six times to an average height of about 1,000 metres.

During July and August in the same year Messrs. Clayton and Maurice experimented on M. Teisserenc's yatch "Ontaria," at the mutual expense of M. Teisserenc de Bort and Mr. Rotch. The journey was made from the Mediterranean, *viâ* Madeira, the Canary and Cape Verde Islands, to latitude 10° north, longitude 30° west, returning *viâ* the Azores and Corunna (Spain) to Havre.

No less than 17 kite flights were made over the ocean, as well as two in the Harbour of Santa Cruz (Teneriffe) to study the sea breeze, and another off Corunna (Spain) during the total eclipse of the sun of August 30th.

Continuous records of barometric pressure and air temperature were obtained from the sea-level to a height of 2,200 metres. Wind velocity was recorded up to 3,100 metres.

The direction of the wind was obtained by measuring the azimuth of the kites.

Mr. Clayton made direct observations upon the Peak of Tryde (Teneriffe) to a height of 3,700 metres; also upon the Peak of Togo to 2,200 metres.

In addition to the observations with kites, large paper balloons were sent up from the "Ontaria." Eleven of these were dispatched from the islands of St. Michael's (Azores), Madeira, Teneriffe, Canada and St. Vincent (Cape Verde). These balloons did not carry self-recording instruments, and their direction and velocity at increasing heights were determined from angular measurements at the ends of a base line laid off on the lee shore of the islands.

One ballon-sonde, however, with self-recording instrument, was sent from the yatch off the Island of Palma, but it shared

the lot of so many ballons-sonde, and was not recovered.

"West of the Azores, on the westerly slope of the permanent area of high barometric pressure, the observations between longitudes 69° and 39° show a slow decrease of temperature with increase of height, amounting to 4.5° per 1,000 metres. In the lower 500 metres the decrease is only 0.24° per 100 metres, owing to inversions of temperature within the first few hundred metres in half the flights. In the next 500 metres there is the more rapid decrease of 0.66° per 100 metres. Upon the easterly and south-easterly slopes of the high pressure, between longitudes 25° and 19°, latitudes 38° and 33° north, the temperature falls at the adiabatic rate of one degree per 100 metres in the lower 500 metres, and then declines more slowly, namely, 0.20° per 100 metres. The adiabatic rate appears to prevail over the ocean at night as well as in the daytime, and the bases of the cumulus clouds generally are not higher than 500 metres. The relative humidity decreases with height on the west of the high pressure, and increases to above 500 metres on the south-east side. In the former region south-west winds prevail, and in the latter locality north-east winds, the south-west winds turning to the left when facing them up to 500 metres, with increasing velocity up to 1,000 metres, and the north-east winds turning to the left and increasing slightly in velocity up to 500 metres, but diminishing above that level."

The observations on the northern edge of the north-east trade, that is, between latitudes 36° and 34° north, are marked by a rapid fall of temperature with height (7.8° per 1,000 metres), which is fastest (0.92° per 100 metres) within the first 500 metres. The relative humidity rises nearly to saturation within the first 500 metres.

The direction of the wind, which is generally north-east, varies but little with altitude, but its velocity increases at about 500 metres. Two observations taken south of the north-east trade in about latitude 10° north show the same features. Within the trade wind region, between latitudes 31° and 15°, the vertical distribution of temperature and moisture is quite different. "Near its origin the trade has the character of a descending current, that is, small vapour contents and little cloud, which is the flat cumulus typical in northern regions of high pressure and descending air. In approaching the equator, that is, south of latitude 24° north, the trade presents characteristics of an ascending current, the relative humidity increases much with height, the sky is cloudy, and there are frequent rains, often accompanied by thunderstorms. The decrease of temperature within the trade region is less than 1° C. in 1,000 metres, there being a fall of 0.58° in the first 500 metres and a rise of 0.56° per 100 in the next 500 on account of the temperature gradients which occur near 1,000 metres at the upper limit of the trade wind. Its depth varies from day to day between 300 and 1,500 metres, and appears to be greatest in the afternoon and least at night. The upper portion is damp with cumulus and strata-cumulus cloud, above which the wind falls light and the relative humidity sinks nearly to zero, coinciding with the rise in temperature, which frequently carries it much above that at sea-level. With increasing altitude there is a gradual shifting of the wind, when facing it, to the right, accompanied by an accelerated velocity up to at least 1,000 metres."

It would appear that above the surface trade there is a warm and dry current about 2,000 metres in depth varying in direction between north-east and north-west, but coming invariably from a direction to the left of the lower wind when facing it. It usually has a velocity much exceeding that of the lower wind.

The third stratum, which begins at 3,000 metres, moves from east, south, or south-west, very generally from the west in equatorial regions and from the south between latitudes 15° and 30° north.

Mr. Clayton's observations on the Peak of Teneriffe indicated that this stratum was dry in its lower portion, but had a larger vapour contents than the air immediately below.

In the portion of the Atlantic investigated by the Franco-American Expedition, the atmospherical circulation was as follows:—

"(1) North of Madeira and near the Azores, the upper winds, as was already known by observations of clouds, are chiefly from west and north-west, this region being generally to the north of the barometric maximum over the ocean and beyond the zone of the trades. (2) The winds blowing towards the equator are from north-east to east in the lower region, and generally from north-west to north-east above 1,000

metres. (3) The return currents from the equator, or anti-trades, are formed by winds having a southerly component, being generally south-west in the latitude of the Canaries, and south-east near the Cape Verdes, thus showing the influence of the earth's rotation. The law of the vertical succession of winds, as formulated by Abercromby, namely, a shifting in the northern hemisphere of the upper winds to the left-hand, when one's back is turned towards the wind, is found not to hold true always, the right or left-handed rotation depending upon the origin of the wind, and, presumably, upon the distribution of the pressure at high levels."

Mr. Rotch states that the vertical distribution of temperature and relative humidity recorded by these observations up to 4,000 metres nearly correspond with those taken by Professor Hergesell during the cruises of the "Princess Alice" in 1904 and 1905.

"Most of his observations of direction of the upper currents differ radically, however, in showing no southerly component, although one balloon, launched west of the Canaries, gave the same direction as that obtained near these islands, meeting interlaced currents from the south-east to south-west, above the north-east trade. From the distribution of pressure on the earth's surface it would be supposed that the upper anti-trade ought to be especially regular in the region between Cape Verde and the Canaries, but this idea is contrary to the belief of Professor Hergesell that the upper south-east and south-west winds observed near these islands, and long considered to furnish a demonstration of the return-trade, are due to local disturbing causes."

It was to settle this point that Mr. Rotch and M. Teisserenc de Bort again dispatched the "Ontaria" during the winter of 1906 to the south and west of the region where their observations had been taken the previous summer.

In this expedition Messrs. Maurice and Nilsson constituted the scientific staff. Their observations both by balloons and the drift of clouds show the existence of the upper anti-trade, the stratified condition giving place to the southerly wind between 3,000 and 4,000 metres.

Mr. Rotch, therefore, concludes that "The classic observations of the return-trade, which were long ago made on the Peak of Teneriffe, indicate a general phenomenon and agree with those obtained over the open ocean by the recent expedition."

There could be no greater evidence of the value of aëronautical science to meteorology than the results of these researches. On the progress of the former will depend the future of the latter. But the benefit will ever be a mutual one, for when by the use of new aëronautical implements the meteorologist has gained new knowledge, that knowledge will re-act on the science which lent its services and extend its usefulness still further.

The Recent International Aëronautical Conference at Brussels.

By A Member of the Paris Aëro Club.

The International Aëronautical Conference, opened at Brussels on September 12th, commenced by a meeting of the Permanent Aëronautical Commission at the Conference Chamber of the Hôtel des Finances, under the presidency of Prince Roland Bonaparte. M. Guillaume, a Swiss delegate, director of the International Office of Weights and Measures at Sièvres, read a paper in praise of the metric system, and advocating its world-wide adoption by aëronauts. Other addresses which followed treated of air currents, atmospheric dynamics, the speed of winds, the varying temperatures at great altitudes, and the necessity of establishing aëronautical observatories for practical meteorology. Captain Voyer contributed a paper on the evolution of dirigible balloons in the horizontal plane, and the measurement of their speeds. M. Georges Claude described experiments which have been in progress for the economical manufacture of hydrogen by a liquid air process.

On the following day the International Aëronautical Federation opened its annual conference and discussed several matters of business relating to the federation of various clubs. The afternoon was devoted to a joint assembly of the Permanent Commission and Federation in the Palais des Academies. Amongst the distinguished aëronauts present were M. A. de la Vaulx, Comte de Castillon de St. Victor, Captain Ferber, M. René Gasnier, M. Maurice Mallet (the greatest French balloon builder), M. E. Boulenger, Commandant Renard, M. F. Jacobs, Chevalier Le Clement de St.-Marcq, Colonel Van den Borren, M. A. Flamache (Professor at the Gand University), Drs.

Bamler, Stade, and Wegener, Captain von Abercron, Captain Voyer, M. Hiedemann, Captain Hildebrandt, Messrs. Roger W. Wallace, K.C., and F. H. Butler, Captain Castagneris Guido, Signor G. L. Pesce (the great Italian engineer), Professor Paul Koffmann, Colonel Schaeck, Mr. Patrick Alexander, Colonel Templer, Lieutenant-Colonel Trollope, Captain A. Hildebrandt (a commander in the Swedish Navy), and M. Paul Tissandier.

On this occasion Commandant Renard read a paper on the History of Navigable Balloons, Captain Voyer on Recent Experiences in Airships, and Captain Ferber gave a discourse on Flight. The joint Conference was continued on the Saturday morning.

In most International Congresses excursions play a prominent part. The principal excursion on this occasion was to the Park of Military Aëronautics, two miles out of Antwerp. Here the aëronautical party were shown over the works by Captain Ferber. In the evening the aëronauts were entertained at a banquet by the Belgian Aëro Club.

On September 15th the balloon race for the 2,000 F. Cup took place from the Parc Cinquantenaire, when the novel sight of 32 balloons massed together and ready filled was witnessed. The following table gives the results of the race:—

INTERNATIONAL BALLOON RACE FROM BRUSSELS.

Order.	Name of Balloon.	Cubic Capacity, mètres.	Aëronaut.	Nationality.	Hour of Ascent.	Hour of Descent	Place of Descent.	Distance Travelled. Kilomètres
			MM.		Sunday.	Monday.		
1	Pommern ..	2,200	O. Erbslöh	Germany ..	17 48	22 30	Seignosse (Cap Breton)	935
2	Le Cognac ..	1,700	V. de Beauclair ..	Switzerland	18 02	18 03	Mimizan (Landes) ..	870
3	Zéphir ..	2,200	Prof. Huntington ..	Gt. Britain	17 09	17 30	Cazaubon (Gers) .	860
4	Britannia ..	2,200	Hon. C. S. Rolls ..	Gt. Britain	17 43	18 06	Sanguinet	840
5	Bamler ..	1,437	E. Mensing	Germany ..	18 37	18 30	Cabanac (Gironde) ..	830
6	Milano ..	2,000	Usuelli	Italy ..	17 07	14 30	St. Amand (Agen) ..	810
7	Ville de Bruxelles	2,200	L. de Brouckère ..	Belgium ..	19 10	18 45	Audenge	800
	Tsebudi .	1,300	Dr. V. Niemeyer ..	Germany ..	20 16	19 20	Andernos (Bordeaux)	800
9	Eden ..	800	E. Boulenger ..	France ..	17 43	16 0	Tonneins (Lot et Garonne)	780
10	Aéro-Gand	1,250	F. Hansen	Belgium ..	18 25	16 0	Pessard (Bordeaux)	770
	Equateur	900	Leprince	France ..	19 55	16 45	Cubnezais (*id.*) ..	770
12	Bezold ..	1,380	A. Cassirer	Germany ..	18 15	17 19	Arcins	740
13	Abercron ..	1,437	Capt. von Abercron	Germany ..	19 58	19 30	Carcans	730
14	Sylphe ..	1,600	P. Tissandier ..	France ..	17 30	12 45	Ste. Croix de Mareuil	660
	Le Charles	1,437	Léon Gheude ..	Belgium ..	17 34	14 05	Marthon	660
16	Quo Vadis ..	1,200	Schelcher	France ..	18 50	12 40	*Près* Limoges (Hte. Vienne)	610
17	Mouche ..	1,600	R. Gasnier	France ..	18 23	12 30	Dompierre (*id.*) ..	575
18	La Perle ..	800	G. Cormier	France ..	18 16	10 0	Saint Bautel	475
19	Elberfeld ..	1,437	Prof. Milarch ..	Germany ..	18 38	13 07	Mehun s/Yères ..	460
20	Luciole ..	900	Ribeyre	France ..	20 03	2 30 Sunday.	Menneville (Aisne)	160
21	Köln ..	1,437	Hiedemann	Germany ..	17 16	23 20	*Près* Charleville ..	125
22	Aéro IV. ..	850	H. Demoor	Belgium ..	17 50	19 12	Sart Dames Avelines	30

Franco-British Exhibtion, 1908.

There will be an aëronautical section in the transportation group of the Franco-British Exhibition to be held at Shepherd's Bush next year.

The following are the sub-classes under which objects will be exhibited:—

Balloon construction: Fabric, varnish, cars, nets, valves, cordage, appliances for stopping balloons, anchors, and grapnels, production of hydrogen and other light gases, captive balloons.

Aërial voyages: Employment of balloons for meteorological observations, air currents,

clouds, temperature at high altitudes, optical phenomena, etc., drawings, maps of journeys, diagrams, photographs.

Military ballooning: Military captive balloons, and their accessories; winding drums for captive balloons; transport waggons, appliances for inflating balloons.

Aërial navigation: Dirigible balloons and apparatus for steering; apparatus for mechanical sails; screw propellers; aëroplanes and parachutes.

Flying machines.

Applications for space should be made to the Hon. Secretary, Franco-British Exhibition (Incorporated), 56, Victoria Street, London, S.W.

NOTES.

The British Government Aeroplane Experiments in the Scottish Highlands.—It appears that those who are conducting the aëroplane experiments in the Highlands of Scotland on behalf of the British Government have so far been successful in preserving essential secrecy, though glimpses of the machine have been obtained from a distance. The scene of operations is in one of the most inaccessible regions of the Grampian Hills, and the site has been placed at the disposal of the engineers by the Marquis of Tullibardine, the eldest son of the Duke of Atholl. A correspondent of the *Daily Express* appears to have got a sight of the aëroplane through field-glasses, and his impressions are related in the *Daily Express*.

The machine, a lightly built, delicately framed structure, was brought out from its shed shortly before midday. In general appearance, as seen through a pair of powerful field-glasses, it is like a large butterfly, with wings always extended, and an airiness that would seem unequal to the results it is expected to achieve. It is not unlike those of M. Santos Dumont, but the Cody kites are extensively used in the construction.

The engineers who are in charge of the station ran the machine for some distance on attached wheels, when the motors responded to the touch of the man on deck, who sits immediately behind the whirling screws. But before the aëroplane rose into the air a gust of wind blowing heavily down the valley from the east swept by, and the ropes by which the machine was held were not released.

The machinery was stopped awhile, but a few minutes later the pulsating of the motor again broke upon the stillness of the mountain air. The screws revolved once more at so rapid a pace that in the sunlight they looked like catherine wheels, but the wind rose into a gale that stormed down the gap, and realising the impossibility of further experiments the aëronauts stopped the motor and carried the machine back to its resting place.

Recent Manœuvres of the Zeppelin Airship.—On September 25th, Count Zeppelin made a very successful ascent of his new airship, and proved that the great increase of horse-power has not been applied without effect.

A fair wind seems to have been blowing when the ascent was made to a height of some 1,000 ft., but the balloon answered to its rudder, made a half turn towards the land, sailed a short distance northwards, then made a quarter turn and faced the wind. The screws were then worked more vigorously, and the balloon followed the required course.

It was directed all round the lake, and several manœuvres were executed without any hitch, and in the teeth of the wind, one of the manœuvres being that the balloon turned a complete circle several times in an extremely small space. The balloon was in the air 4 hours 17 minutes. The speed is stated to have been 50 feet per second.

M. Santos Dumont's Hydroplane.—Variety certainly characterises M. Santos Dumont's more recent experiments. His latest departure is called an hydroplane, and with this he hopes to skim the surface of the water. The apparatus consists of three cigar-shaped reservoirs filled with compressed air. On the centre one is fixed the screw propeller.

The centre one is ten metres long and those on either side of it a metre in length. Over the air reservoirs is built a small platform where the chauffeur takes his seat before the steering wheel.

The Accident to M. Bleriot's Aëroplane.—M. Bleriot had a very narrow escape when experimenting with his aëroplane on September 18th. It appears that he made an excellent start and rose to a considerable height. After having sailed through the air for about 150 yards the motor stopped and the aëroplane fell to the ground, being dashed to pieces. M. Bleriot escaped with only a cut face.

The accident is ascribed to a flaw in the motor, and not to any defects in the aëroplane.

As the *Daily Telegraph* points out, this accident shows the danger of trying to steer too high with the machine during the preliminary trials.

"The Giroplane."—The *Daily Telegraph* recently gave an account of a new flying machine called "The Giroplane," and invented by M. Brequet and M. Michet. The apparatus consists of four large horizontal propellers, each composed of thirty-two winglets, and forming all together a superficies of twenty-six square yards. The motive power is

supplied by a 40 h-p. motor. The four propellers are slightly inclined forwards for the purpose of propulsion, the main power being reserved for lifting. As the machine is not yet complete, having no car or basket attached, an armchair was suspended under it, in which one of the inventors took his seat. The motor was then set going, and the machine rose with ease from the ground and appeared to be in perfect equilibrium. Four men did all they could do to hold it down, as the inventors had no intention as yet to attempt a free flight, the apparatus still needing among other accessories a steering device. They are, however, sanguine after this trial that their machine will be a practical one, and will have the advantage of rising at once in the air without any previous horizontal start. The total weight which it lifted was more than half a ton.

Hydrolith.—Hydrolith would appear to have a future before it as a means of providing hydrogen for filling balloons. A comparatively small quantity of this substance produces a large amount of hydrogen, one pound weight supplying 16 cubic feet of the gas. Hydrolith is known to the chemist as calcium hydride. Oxylith gives 2 4 cubic feet of oxygen per pound, while calcium carbide gives about double that amount. But pure hydrolith gives over 18 cubic feet to the pound. The commercial hydrolith contains about 10 per cent. of impurities, mainly oxide and nitride of calcium. Metallic calcium is exposed to a current of hydrogen in horizontal retorts, heated to a high temperature.

The gas is gradually absorbed by the calcium, which is thus converted into hydrolith. The pure substance forms a white crystalline mass, which has no known solvent. Commercial hydrolith occurs in irregular, slate-grey lumps.

The Uses of Airships in War.—The opinions of Major Von Parseval, quoted in the *Morning Post* of September 25th, support views as to the scouting uses of military airships expressed in another part of this Journal. He is, however, somewhat sceptical concerning the use of the navigable balloon as a weapon of war. It will, he thinks, in its improved condition, serve as a better reconnoitrer in times of war, and will, with the aid of wireless telegraphy, be the means of enabling news of an enemy's movements to be more quickly obtained. The carrying capacity of the balloon is still relatively very small, and it would require a vast flotilla of airships to carry guns of even small calibre and projectiles in sufficient quantities to inflict serious damage on an enemy. He points out that such great bodies as the present balloon offer an easy aim to an enemy's sharpshooters, and a navigable balloon must for the present remain fairly near the surface of the earth, as they cannot yet contend with the currents, etc., of the higher regions of the air.

Foreign Aëronautical Publications.

(In this list a selection of some of the more notable articles is only given.)

L'AÉRONAUTE (Paris).

July.—Note sur les Aéroplane (M. A. Elévé). — Suspension pour Photographie par cerfs-volants (J. Lecornu).—L'Aérostation au Japon. —Sur le Congrès des Etudes Solaires tenu à Meudon (W. de Fonvielle).

L'AÉROPHILE (Paris).

Portraits d'Aéronautes Contemporains: Commandant Bouttieaux (G. Besançon).—Equilibre Longitudinal Automatique des Aéroplanes (José Weiss).—Les Frères Wright à Paris.—L'aviation à l'Académie des Sciences: Mode de construction des Aéroplanes augmentant leur valeur sustentatrice et leur stabilité de route: Importance des réactions sur un plan mince et principe du movement relatif (A. Goupil).—Note sur le coefficient d'utilisation des hydroplane à hélice aérienne (Lieutenant Crocco).—Une femme Artiste: Mme. Marie Anne Lafaurie (François Peyrey). — Essais heureux de nouvel Aëroplane Blériot (Ancelle). — Le dirigéable militaire "Patrie" (L. Lagrange).

August.—Portraits d'Aéronautes Contemporains: Capitaine Voyer (Georges Besançon).—Le Grand-Prix de l'Aéroclub de France 1907 Réglement. — Les grandes journées Aéronautiques de Bruxelles.—Le dirigéable militaire, "Patrie."—Nouvelles expériences de dirigéables en Allemagne.—Aéroplanes d'hier et de demain. —Les essais de l'aéronat "La Ville de Paris" (Philos).

ILLUSTRIERTE AERONAUTISCHE MITTEILUNGEN (Strassburg).

July.—Karl J. Trübner.—Friedrich Ritter Von Lössl. — Capitano Ulivelli. — Kritische Betrachtungen über die Neuen Drachenflieger (Professor G. Wellner).—Entlastete Flugmaschinen.—Flugtechnische Übersicht.

August. — Die Erforschung der höheren Schichten der Atmosphäre auf der Reise S.M.S. "Planet" von Januar bis October, 1906. —Aus dem Kgl. Aëronautischen observatorium Lindenberg (R. Assmann).

September.—Die Erforschung der höheren Schichten der Atmosphäre auf der Reise S.M.S. "Planet" von Januar bis October, 1906 (Schluss).—Das Zweite französische Militärluftschiff "Patrie" (R. Clouth).—Der Lenkbare "La Ville de Paris" (G. Espitallier).

WIENER LUFTSCHIFFER-ZEITUNG (Vienna).

July.—Vermisste Luftschiffer.—Ein Ballon vom Blitz Getroffen Die Fahrt Leipzig-Leicester.—Ein entflohener Ballon.—Die Düsseldorfer Wettfahrten—Ein Motorboot mit Luftschaube.—Vom Sonnen-kongress in Meudon.

— Wellman's Expedition.— Santos Dumont No. XVI.—Vom Kongress in Jamestown.

August.—Andrée, 1897-1907.—Von Mailand nach Bozen.— Wettfahrt in Lüttich. — Ein deutsches Militärluftschiff.—Vom Perseval Ballon—"La Patrie."—Einfluss der Sonne Aufs Wetter.

BOLLETINO DELLA SOCIETÀ AÉRONAUTICA ITALIANA (Rome).

Il dirigibile in mare sul cono d'ancora (G. A. Crocco).—Il prezzo del gas illuminante in Italia.—Il nuovo aëroplano C.R.—Da Lipsia a Leicester in ballone.—Sulla frequenza dei venti a delle calme a Pavia.—Osservazioni dell'alta atmosfera con cervi-volenti. All'Osservatorio di Pavia, dott P. Gamba.

BULLETIN, SCHWEIZER, AERO CLUB (Berne).

July.—Fahrtenberichte des Jahres 1906 (C. Deutsch).—L'origine des ballons à air chaud (A. Bernoud).—Unsere Ballon Kompagnie (mit Vier Bildern) (O. Bochsler.)

Applications for Patents.

(*Made in July, August, and September.*)

The following list of Applications for Patents connected with Aëronautics has been specially compiled for the AËRONAUTICAL JOURNAL by Messrs. BROMHEAD & Co., Patent Agents, 33, Cannon Street, London, E.C.

JULY.

15248. July 2nd. G. B. BOTLEY and J. ROSS. **New Device to Minimise Atmospheric Pressure on Locomotives, Motor Cars, Vehicles of all Kinds, Ships, Boats, and other Vessels Travelling Through the Air.**

15438. July 4th. C. L. BUCKWALTER. **Improvements in Airships.**

15457. July 4th. B. H. WALLIN. **Improvements in Mechanisms for Transmitting Motion to the Wings of Flying Machines.**

15590. July 6th. J. R. PORTER. **Improvements in Airships and in Apparatus for Propelling the same.**

15654. July 8th. H. L. GODDEN. **Improvements in Aerial Tracks for Popular Amusement, Toys, and Other Purposes.**

15796. July 9th. F. R. SIMMS. **Improvements in Flying Machines.**

15890. July 10th. T. H. ADDIS. **Improved Flying Machine.**

15938. July 11th. L. T. QUEREDO. **Improvements in Fusiform Aerostats.**

16063. July 12th. A. MITCHELL. **Improvements in Aerial Navigation.**

16121. July 13th, F. BOLLHORN. **Aerial Ship.**

16176. July 15th. F. E. JACKSON. **Improvements in Kites.**

16297. July 16th. H. EXHINGER. **Improvements in Dirigible Airships.**

16484. July 18th. E. E. LINDKVIST. **Driving Device for Boats, Airships, and the like.**

16967. July 24th. M. SCHIAVONE. **Improvements in Dirigible Aerostatic Devices.**

17011. July 25th. F. H. PAGE. **Improvements in Aerial Machines, such as Aeroplanes, Aerostats, and the like.**

17152. July 26th. J. H. LEE. **New or Improved Means and Apparatus for Raising and Propelling Aerial Cars over or on Water or Land.**

17366. July 29th. J. A. COLQUHOUN. **Improvements in Apparatus for Automatically Preserving the Equilibrium of Aerial Machines.**

AUGUST.

17048. August 2nd. T. A. GOSKAR. **Improvements in Flying Machines of the Heavier than Air Type.**

17725. August 2nd. H. B. WEBB. **Working Aeroplane or Flying Machine, Toy Model. Some of the Principles of Which are Applicable to Larger Machines.**

17999. August 8th. H. BLACKBURN. **Dirigible Balloon.**

18158. August 10th. J. FROSSARD. **Improvements in or Relating to Flying Machines.**

18246. August 12th. H. KOST AND A. J. MAYER. **Improvements in or connected with Airships.**

18559. August 16th. L. GATHMANN. **Improvements in Dirigible Airships.**

18765. August 20th. S. PERON. **New System of Miners' Parachute.**

18993. August 23rd. H. M. ROGERS. **Improvements in Aerial Vessels.**

19087. August 24th. H. E. HUGHES. **Improved Kite.**

19161. August 26th. H. L. TODD and C. B. PHELPS. **Improvements in Aerial Navigation.**

SEPTEMBER.

19586. September 5th. SIEMENS BROS. **Improved Means for Connecting Alternating Current Generators to their Prime Movers.**

19822. September 4th. R. A. POMIANOWSKI. **New or Improved Means for Balloons and Vessels.**

20313. September 12th. A. G. W. DE TIVOLI. **Flying Machine Regulator.**

20554. September 16th. H. L. ROBINSON. **Improved Flying Machine.**

20601. September 19th. W. C. JOHNSON. **Improvements in Flying Machines.**

20811. September 19th. L. BILTCLIFFE. **Improvements in Kites.**

20823. September 19th. C. W. KING. **Flying Machine.**

20917. September 20th. A. P. FILIPPI. **Improvements in Surfaces of Ascension or Aeroplanes for Flying Machines.**

21002. September 21st. A. MICHAEL. **Flying Machine.**

21030. September 21st. M. M. L. STUCKENHOLTZ. **Improvements in Mrgnets for Lifting.**

NOTE ON GOING TO PRESS:—

The Injury to the British Military Airship in the Recent Gale.

Just on going to press a report was circulated in London that the British Military Airship had been wrecked in a gale of wind at the Crystal Palace. The report, however, was a much exaggerated one. The incident which occurred to the Government Balloon on October 10th was one very likely to happen to a navigable balloon anchored in our uncertain climate.

It appears that the airship was caught by a squall between 8 and 9 in the morning, and a number of the stakes to which she was attached were pulled out, with the result that the contrivance heeled over.

The most fitting comment to make on the accident would seem to be a commendation of the efficiency of the Sappers in charge of the airship, who speedily accomplished the necessary deflation, and thus saved the envelope and motors from threatened damage.